

REMARKS

Claims 1, 3, 15, 17, 18 and 30-49 are now pending in the application. By this amendment, Claims 4, 15, and 17 are amended and Claim 18 is cancelled without prejudice or disclaimer of the subject matter contained therein. The basis for these amendments can be found throughout the specification, claims, and drawings originally filed. No new matter is added. The preceding amendments and the following remarks are believed to be fully responsive to the outstanding Office Action and are believed to place the application in condition for allowance.

The Examiner is respectfully requested to reconsider and withdraw the rejections in view of the amendments and remarks contained therein.

REJECTION UNDER 35 U.S.C. § 103

Claims 4, 18, 40 and 42 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Saitoh et al. (European Pat. Application No. 766310A2) in view of Chen (U.S. Pat. No. 6,191,023).

Claims 41 and 43 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Saitoh in view of Chen, as applied above, and further in view of Dion (U.S. Pat. No. 5,130,275).

Claims 44-49 are rejected under 35 U.S.C. § 103(a) as being unpatentable over the respective combination of the references applied to claims 40 or 41, as shown above, and further in view of Watanabe et al. (U.S. Pat. No. 6,218,281).

These rejections are respectfully traversed.

Independent Claim 4 calls for a method of forming a bump including the steps of “(a) forming a resist layer to have through-holes” and “(b) forming metal posts on the pad conforming to a shape of the through-holes.” Claim 4 also calls for removing the resist layer which shapes the metal posts after step (b) so as to form a space between the metal posts. See Specification at pg. 15, Ins. 24-27, pg. 16, Ins. 1-16, and FIGS. 1 and 3A-3C.

In this manner, the present invention discloses a recess (36) for receiving solder or brazing materials which overflow during application of the soldering material to a bump (34). The recess (36) is formed by the shape of a through hole (22) formed in a resist layer (20) and extends along the entire length of each post. See FIG. 5. The through hole (22) includes a series of projections (24) that form the depressions or recesses (36) in the metal layers (30). See Specification at pg. 24, Ins. 1-6.

The Examiner states that Saitoh fails to teach forming through-holes on a pad. See Office Action mailed April 1, 2004 at pg. 2. Applicants respectfully submit that Chen fails to cure this deficiency on Saitoh. Further, neither Saitoh nor Chen teaches removing a resist layer which shapes the metal posts after forming the metal posts on the pad conforming to a shape of the through holes so as to form a space between the metal posts.

Because Chen and Saitoh do not disclose all the claimed steps, Applicants' invention is not taught or suggested by the prior art. In this manner, it is believed that independent Claim 4, as well as Claims 40-49, dependent therefrom, are in condition for allowance. Applicants further note that the

rejection with respect to independent Claim 18 is moot as Claim 18 is cancelled without prejudice. Accordingly, Applicants respectfully request reconsideration and withdrawal of these rejections.

Claim 15 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Saitoh in view of Chiu (U.S. Pat. No. 6,414,849).

This rejection is respectfully traversed.

Independent Claim 15 calls for a method of fabricating a semiconductor device including the steps of “bonding a plurality of metal posts to a plurality of leads.” See FIGS. 3A-3C. Each of the metal posts has “a first end formed adjacent the pad and a second end, spaced apart from, and opposite the first end” and a recess formed in a side surface of each post “extending from the first end to the second end.” See Specification at pg. 16, Ins. 4-20 and FIG. 1.

The Examiner states that Saitoh fails to teach metal posts having a side surface including a recess for receiving soldering or brazing material. See Office Action mailed April 1, 2004 at pg. 3. Applicants submit that Chiu fails to cure this deficiency.

Chiu teaches a post (906) having reduced diameter tips (908). See Chiu at Col. 9, Ins. 58-59 and FIG. 9A. The reduced diameter tips are inserted into a solder paste or reflowed solder ball (948) to form a contact connection and to provide a diameter “not substantially greater than the largest diameter” of the posts. See Chiu at Col. 9, Ins. 58-64 and FIG. 9A. In this manner, the tip provides the post with a *localized* area for receiving a solder material. See FIG.

9A. As such, the tip of Chiu does not extend along the entire length of the post, and is therefore different from the claimed invention.

Because Chiu does not disclose a recess formed in a side surface of a post and extending along an entire length of the post, and none of the cited references cures this deficiency, Applicants' invention is not taught or suggested by the prior art. In this manner, it is believed that independent Claim 15 is in condition for allowance. Accordingly, Applicants respectfully request reconsideration and withdrawal of the rejection.

Claim 17 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Saitoh in view of Ono et al. (U.S. Pat. No. 6,525,422).

This rejection is respectfully traversed.

Independent Claim 17 calls for a method of fabricating a semiconductor device including the steps of "bonding a plurality of metal posts to a plurality of leads." See FIGS. 3A-3C. Each of the metal posts includes a hole exposing the pad, the hole penetrating each of the metal posts vertically from the metal pad without penetrating each of the metal posts horizontally to the pad. See Specification at pg. 34, Ins. 12-20 and FIGS. 12A-12B.

The Examiner states that Saitoh fails to teach metal posts having a hole exposing a pad. See Office Action mailed April 1, 2004 at pg. 4. Applicants submit that Ono fails to cure this deficiency.

Ono teaches a *pair* of bump electrodes (6a and 6b) formed on a substrate (1). See Ono at Col. 6, Ins. 12 and FIGS. 1 and 3a-b. A slit or slot is formed generally between the electrodes to thereby separate the electrodes. See FIGS.

1 and 3a-b of Ono. Ono fails to teach a metal post having a hole exposing the pad, the hole penetrating each of the metal posts vertically to the metal pad without penetrating the metal posts horizontally to the pad. Rather, Ono teaches a slit formed between respective electrodes.. See FIG. 1 of Ono.

Because neither Saitoh nor Ono discloses the claimed elements, Applicants' invention is not taught or suggested by the prior art. In this manner, it is believed that independent Claim 17 is in a condition for allowance. Accordingly, Applicants respectfully request reconsideration and withdrawal of the rejection.

ALLOWABLE SUBJECT MATTER

Applicants thank the Examiner for the allowance of Claims 1, 3, 5-14 and 30-39.

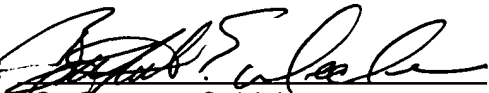
CONCLUSION

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action, and as such, the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication

will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

Dated: June 30, 2004

By: 
G. Gregory Schivley
Reg. No. 27,382
Bryant E. Wade
Reg. No. 40,344

HARNESS, DICKEY & PIERCE, P.L.C.
P.O. Box 828
Bloomfield Hills, Michigan 48303
(248) 641-1600

GGG/BEW/MHS